

## Mitchell, Brian

---

**From:** Arnold, Doug <Doug.Arnold@alston.com>  
**Sent:** Thursday, June 29, 2017 7:22 AM  
**To:** Mitchell, Brian  
**Cc:** DeMoss, Nicole  
**Subject:** Electrolux GMP  
**Attachments:** Jefferson GMP 6-28-17.pdf

Brian:

Per your request, here is a copy of Golder Associates' Groundwater Monitoring Plan. It has been approved by Electrolux, and Golder anticipates commencing implementation next month.

Regards, Doug

**Douglas S. Arnold | Alston & Bird LLP**

Partner and Co-Chair,  
Environmental, Energy & Natural Resources Practice Group  
1201 West Peachtree Street | Atlanta, GA 30309-3424  
T: 404-881-7637 | F: 404-881-7777 | E: [doug.arnold@alston.com](mailto:doug.arnold@alston.com) | [www.alston.com/doug\\_arnold/](http://www.alston.com/doug_arnold/)

Atlanta | Beijing | Brussels | Charlotte | Dallas | Los Angeles | New York | Research Triangle | San Francisco | Silicon Valley | Washington DC  
18 Consecutive Years on Fortune® Magazine's "The 100 Best Companies to Work For"™

---

NOTICE: This e-mail message and all attachments may contain legally privileged and confidential information intended solely for the use of the addressee. If you are not the intended recipient, you are hereby notified that you may not read, copy, distribute or otherwise use this message or its attachments. If you have received this message in error, please notify the sender by email and delete all copies of the message immediately.

RCRA 06/29/2017



569425



REPORT

# GROUNDWATER MONITORING PLAN

FORMER ELECTROLUX HOME PRODUCTS, INC.  
FACILITY, JEFFERSON, IOWA

**Submitted To:** Electrolux Home Products, Inc.  
10200 David Taylor Drive  
Charlotte, NC 28262

**Submitted By:** Golder Associates Inc.  
670 North Commercial Street, Suite 103  
Manchester, NH 03101 USA

**Date:** June 2017

**Project No.** 103-87305.01

**A world of  
capabilities  
delivered locally**





## Table of Contents

|       |   |    |
|-------|---|----|
| 1.0   | INTRODUCTION.....   | 1  |
| 2.0   | GROUNDWATER MONITORING SYSTEM.....  | 2  |
| 2.1   | Monitoring Well Network .....   | 2  |
| 2.2   | Groundwater Sampling Analytical Methods .....                                   | 2  |
| 2.3   | Well Operation and Maintenance.....   | 2  |
| 3.0   | SAMPLING ANALYSIS PROGRAM .....   | 3  |
| 3.1   | Field Log Book and Field Form Procedures .....                                  | 3  |
| 3.1.1 | Field Log Book .....  | 3  |
| 3.1.2 | Equipment Calibration Forms Procedures.....                                     | 4  |
| 3.1.3 | Groundwater Sample Collection Field Form Procedures .....                       | 4  |
| 3.2   | Monitoring Well Visual Assessment.....  | 5  |
| 3.3   | Equipment Calibration.....  | 5  |
| 3.4   | Equipment Decontamination Procedures .....                                      | 5  |
| 3.4.1 | Decontamination Equipment and Solutions.....                                    | 5  |
| 3.4.2 | Field Water Quality Meter and Water Level Meter Decontamination Procedures..... | 6  |
| 3.5   | Water Level Gauging .....   | 6  |
| 3.6   | Purging Procedure .....   | 6  |
| 3.7   | Sample Collection .....   | 7  |
| 3.8   | Sample Preservation and Handling .....  | 7  |
| 3.9   | Chain-of-Custody Program .....  | 8  |
| 3.9.1 | Sample Labels .....   | 8  |
| 3.9.2 | Sample Seal.....  | 9  |
| 3.9.3 | Chain-of-Custody Record .....   | 9  |
| 4.0   | ANALYTICAL AND QUALITY CONTROL PROCEDURES.....                                  | 10 |
| 4.1   | Data Quality Objectives.....  | 10 |
| 4.2   | Quality Assurance/Quality Control Samples.....                                  | 11 |
| 4.2.1 | Field Equipment Rinsate Blanks .....  | 11 |
| 4.2.2 | Field Duplicates.....   | 11 |
| 4.2.3 | Laboratory Quality Control Samples.....   | 11 |
| 4.3   | Laboratory Quality Control Procedures.....                                      | 12 |
| 4.3.1 | Laboratory Documentation.....   | 12 |
| 4.4   | Laboratory Analyses .....   | 13 |
| 4.4.1 | Limits of Quantitation (LOQs) .....   | 13 |
| 4.4.2 | Method Blanks .....   | 13 |
| 4.5   | Data Review, Verification, and Validation .....                                 | 14 |
| 4.6   | Reconciliation with User Requirements .....                                     | 15 |
| 5.0   | DATA MANAGEMENT PROCEDURES .....  | 16 |



|     |                                |    |
|-----|--------------------------------|----|
| 5.1 | Analytical Data Record.....    | 16 |
| 5.2 | Project Filing Procedures..... | 17 |
| 6.0 | REPORTING.....                 | 18 |

### List of Tables

|         |   |
|---------|---|
| Table 1 | Environmental Monitoring Program  |
| Table 2 | Groundwater Sampling Analytical Methods and QA/QC                                   |
| Table 3 | Sample Containers, Preservatives, Volumes, Holding Times, and Shipping Requirements |

### List of Figures

|          |  |
|----------|--|
| Figure 1 | Site Location Map  |
| Figure 2 | Site Plan Illustrating Monitoring Well Locations                                     |
| Figure 3 | Site Plan Illustrating Monitoring Well Locations – Upper Tills and Yellow-Brown Till |

### List of Attachments

|              |                                     |
|--------------|-------------------------------------|
| Attachment A | YSI Calibration Form                |
| Attachment B | Groundwater Sample Collection Form  |
| Attachment C | Record of Water Level Readings Form |



## 1.0 INTRODUCTION

On behalf of Electrolux Home Products, Inc. (Electrolux), Golder Associates Inc. (Golder) prepared this Groundwater Monitoring Plan (GMP) for the former Electrolux manufacturing facility located at 601 East Central Street in Jefferson, Greene County, Iowa (Site) (see Figure 1). The approximately 20.75 acre Site was previously improved by a 75,542 square-foot single-story former manufacturing/office/warehouse building constructed in 1960, with additions constructed in 1973, 1984, 1988, and 1992. The area of the Site formerly used for manufacturing operations encompasses approximately 7.5 acres of the 20.75-acre property owned by Electrolux (herein referred as the "facility" or "former manufacturing area"). Electrolux previously leased the remainder of the property to the south and east of the facility for agricultural use. Electrolux has since terminated the agricultural leases for these areas.

The Site was developed in 1960 to manufacture dishwasher motor transmissions. Electrolux closed the facility in March 2011, decommissioned and removed the manufacturing equipment and other items from the facility buildings, and demolished the buildings. The concrete building slabs, parking areas, chain-link fence, and sidewalks are still in place.

Electrolux has assessed Site soil and groundwater impacts and confirmed impacts do not extend off Electrolux-owned property. Electrolux intends to maintain control of the property and implement appropriate land use restrictions, if necessary. Although Electrolux has no immediate plans for redevelopment of the Jefferson property, future use of the property would be restricted to industrial use until such time it is determined to be suitable for other potential uses. As a next step toward moving the Site to a resolution of remedial actions, Golder has prepared this GMP for future management of Site-related impacts. The GMP is intended to serve as the procedural document for activities related to collecting, analyzing, and managing groundwater samples and data. The plan includes the following:

- Rationale for wells included in the groundwater monitoring plan;
- Sampling location, frequency, and analytical methods;
- Monitoring well decommissioning plan; and
- Standard operating procedures (SOPs) for sampling, quality control, and data validation.



## 2.0 GROUNDWATER MONITORING SYSTEM

The GMP is intended to provide a framework for consistent sampling and analysis procedures (as provided in Sections 3 and 4) that are designed to provide representative groundwater quality data. The monitoring well network, analytical methods, decommissioning procedures, and well operation and maintenance procedures are described in the following sections.

### 2.1 Monitoring Well Network

Electrolux intends to monitor groundwater quality in the designated monitoring wells shown in Figure 2. Wells included in the monitoring network will be used to monitor groundwater quality within the identified groundwater plume, on the edges of the plume, and outside of the plume boundary at various depths (See Figure 3 for Upper Tills and Yellow-Brown Till Well Locations). Table 1 provides the sampling rationale for each well included in the monitoring network.

### 2.2 Groundwater Sampling Analytical Methods

Electrolux selected the groundwater sampling analytical methods and parameters to monitor the horizontal and vertical extent of impacted groundwater based on previous Site assessment results. Groundwater will initially be monitored on a bi-annual basis for the following parameters:

- Spring - volatile organic compounds (VOCs), alkalinity, dissolved gases (methane, ethane, and ethene), sulfate, sulfide, chloride, iron, manganese, and total organic carbon
- Fall – VOCs

Table 2 lists the analytical method for each parameter and number of quality control samples (e.g., field duplicates and trip blanks) that will be collected during each event.

### 2.3 Well Operation and Maintenance

The monitoring wells will be operated and maintained so they perform to their design specifications throughout the life of the monitoring program. Field personnel will visually assess the monitoring well protective casings, locks, and concrete pads for damage before each monitoring event. Electrolux will repair any damaged well, if needed.



### 3.0 SAMPLING ANALYSIS PROGRAM

At the direction of Electrolux, Golder will perform groundwater sampling in accordance with generally accepted practices within the industry, and in accordance with the SOPs discussed herein. The following sections, which are consistent with EPA low-flow sampling guidance and the requirements, outline the proposed sample collection procedures. Although this section provides reference to specific forms, the use of other equivalent forms to record the necessary data may be substituted.

#### 3.1 Field Log Book and Field Form Procedures

The field log book provides a means to record daily significant events, observations, and measurements during sampling and monitoring activities. Sufficient data and observations shall be recorded in the field log book and/or field forms to enable reconstruction of field events.

It is the responsibility of the Field Team Leader to maintain centralized daily records of all significant field events, observations, and measurements during field assessment activities. Members of the field team are responsible for maintaining complete records of their actions, observations, etc., in the field log books and providing this information to the Field Team Leader at the end of each day. If observations and measurements are taken in an area where the field logbook may become contaminated or if the field personnel are spread over a large area, separate waterproof bound and numbered field log books may be maintained. The Field Team Leader will make photocopies of all field data entries on following each monitoring event, submit the copies to the Project Manager for inclusion with the project file, and shall sign and date the entries at the completion of each task or at the end of each day. The field team members will retain the individual field log books until the log book is filled or the completion of the project, at which time possession of the log books is transferred to the Project Manager. The Project Manager and/or Field Team Leader are responsible for collecting the forms and entering them into the project file. Field personnel are responsible for assuring that forms are completed in waterproof ink.

If an individual makes an error while filling out the log book, a line shall be drawn through the error and the correction entered. Individual pages, which will be sequentially numbered, shall not be removed from bound log books.

##### 3.1.1 Field Log Book

The Field Team Leader and field staff are responsible for logging dates, times, subcontractors, field personnel, field activities, field observations, and any other pertinent information during field activities. Field log book entries shall be legible and include, at a minimum, the following information:

- Date
- Project name and number
- Weather and temperature



- List of personnel present including subcontractors and visitors. The time of arrival and departure shall be noted next to each name
- Name and times of visit by unauthorized personnel to the Site
- Business phone calls along with the name of the field personnel making the call and the phone call recipient, time, and a brief description of the topic of conversation
- Description of all field activities completed
- The time of any photographs taken along with the direction and descriptions of the photographs and weather conditions

If page numbers are not pre-printed in the field log book, sequential page numbers shall be written at the top of each page.

### **3.1.2 Equipment Calibration Forms Procedures**

Equipment calibration forms are required to record and track daily calibration of each instrument. The equipment manual provides instructions on proper calibration procedures. Information to be recorded shall include the following:

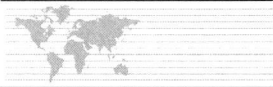
- Date and time of calibration
- Equipment calibrated with model number and/or identification number
- Media used to calibrate instrument (e.g., solutions or gas)
- Calibration media information, lot numbers, and concentration
- Pre- and post-calibration readings

Follow the provided instructions and record the necessary information on the calibration field forms (Attachment A). Field personnel will provide the original Calibration Forms to the Project Manager, for inclusion in the office project files.

### **3.1.3 Groundwater Sample Collection Field Form Procedures**

Information collected during the groundwater sampling shall be recorded on groundwater sample collection field forms and field log books, as appropriate. The groundwater sample collection field form (Attachment B) provides a record of the sampling methods and equipment, monitoring well information, and chemical analyses performed. The field sampling records should accurately document field sampling procedures and data collection. Because sampling procedures may alter the chemical results, documenting sampling process is an important part of verifying the integrity of the samples. The following information shall be recorded in the groundwater sample collection form:

- Date and time of purging and sampling
- Sampling location designations
- Depth to water
- Total depth of well



- Standing water column
- Well inside diameter
- Volume of standing water in well
- Purging and sampling device
- Purge volume
- Sample time
- Field observations such as odor, color, and apparent turbidity
- Field water quality data including pH, oxidation reduction potential (ORP), specific conductivity, temperature, and dissolved oxygen
- Chemical analyses requested
- Number of samples provided for each laboratory analysis

The groundwater sample collection field forms shall be legible, dated, and signed by the person making the entry. Field personnel will provide the original groundwater sample collection forms to the Project Manager, for inclusion in the office project files.

### 3.2 Monitoring Well Visual Assessment

Prior to performing any water purging or sampling, a field team member will assess the condition of each monitoring well. The condition of each monitoring well will be assessed for any physical damage or other breach of integrity. The security of each monitoring well will also be assessed to confirm that no outside source constituents have been introduced to the monitoring well. The results of the well inspections will be documented in the comments section of the field sampling forms and/or in field log books.

### 3.3 Equipment Calibration

Equipment used to record field water quality parameters will be calibrated each day prior to use following manufacturers' recommendations and checked at the end of each day. Calibration solutions for standardization materials will be freshly prepared or from non-expired stock. In the absence of manufacturer or regulatory guidance, field equipment should be calibrated to within +/- 10 percent of the standard (or 0.1 standard units for pH meters). Equipment that fails calibration may not be used. Calibration information will be recorded on the field Instrument Calibration Form included in Appendix A.

### 3.4 Equipment Decontamination Procedures

#### 3.4.1 Decontamination Equipment and Solutions

Specifications for standard cleaning materials include:

- Soap shall be a phosphate-free laboratory detergent such as Liquinox® or Alconox®. Use of other detergent must be justified and documented in the field log books and investigative reports.



- Analyte free water (distilled water) is tap water that has been treated with activated carbon and a standard deionizing resin column. At a minimum, the finished water should contain no detectable heavy metals or other organic or inorganic compounds (i.e., at or above analytical detection limits).

#### **3.4.2 Field Water Quality Meter and Water Level Meter Decontamination Procedures**

Field personnel will use the procedures in this section to decontaminate all non-dedicated monitoring equipment (e.g., field water quality meter and water level meter) to collect field water quality measurements. The procedures include:

1. Rinse thoroughly with distilled or deionized water prior to each use.
2. If Non-Aqueous Phase Liquid (NAPL) is observed, field personnel will use an Alconox water solution, scrub the meter with a brush, and use a double rinse the meter with distilled water.

### **3.5 Water Level Gauging**

Field team members will measure water levels prior to starting groundwater purging. These measurements will be taken within a 24-hour period to the extent feasible and will be recorded on the Record of Water Level Readings form (included as Attachment C). Static water levels will be measured in each monitoring well prior to purging using an electric meter accurate to 0.01 foot. The measurement will be obtained from the surveyed measuring point on each well (i.e., top-of-casing).

Prior to initial use and between wells, the portion of the water level indicator that comes in contact with groundwater in the well will be decontaminated to avoid cross-contamination between monitoring wells. In addition to decontaminating the downhole equipment, sampling personnel will don new gloves between wells, and more frequently as needed, to avoid cross-contamination between monitoring wells.

### **3.6 Purging Procedure**

Golder will collect groundwater samples using a micro-purge technique. Micro-purge sampling reduces the volume of water that must be purged from a well before representative samples can be collected, and typically provides for the collection of more representative samples than do other purge methods, as well as consistency in analytical results between sampling events.

The purge should be conducted at a rate approximately equal to the well yield to avoid drawing stagnant well column water into the pump (i.e., between 100 and 500 milliliters per minute). During the discharge tubing purge, the flow rate and the depth to groundwater should be monitored on regular intervals (every 3 to 5 minutes) to verify that the purge activities are not removing stagnant water from the water column in the monitoring well. Stabilization of the water column will be considered achieved when three consecutive water level measurements vary by 0.3 foot or less at a pumping rate of no less than 100 ml/min.



Collection of field measurements will begin after evacuating the water in the pump system. Depth to water measurements and field water quality parameter measurements will be made during purging on approximate 3- to 5-minute intervals. If a field meter equipped with a flow cell is used, the volume of the flow cell should be purged between field measurements. Stabilization will be attained and purging complete when three consecutive measurements of each field parameter vary within the following ranges:

- Temperature:        +/- 10% - Degrees Celsius
- pH:                    +/- 0.1 - Standard Units
- Conductivity:        +/- 3% - milliSiemens
- ORP:                  +/- 10 mV - millivolt
- DO:                    +/- 10% (or +/- 0.1 mg/L if less than 1.0 mg/L) – milligrams per liter

All data gathered during monitoring well purging will be recorded on a Groundwater Sample Collection Form, an example of which is included in Attachment B.

In addition to the water quality parameters, the flow rate may be monitored on regular intervals during the micro-purge to verify that the micro-purge activities are not removing stagnant water from the water column in the monitoring wells. In general, purge rates when using micro-purge sampling procedures should not exceed 500 milliliters per minute. Any measurements taken should be recorded on a Field Log or in the log book to document steady-state flow conditions during the purge. Field personnel will containerize the purge water generated during sampling activities in DOT-approved 55-gallon drums for proper off-Site disposal.

### 3.7 Sample Collection

Once the field water quality data indicate that the micro-purge activities have been completed, required samples will be collected directly from the discharge hose on the pump into laboratory-provided, pre-preserved sample containers selected for the required parameters or compatible parameters. Sample collection should be performed at the same or lower flow rate than used during the micro-purge. Sample containers will be kept closed until the time each set of sample containers is filled. Anticipated sample container, minimum volume, chemical preservative, and holding times for each analysis type are provided in Table 3. These may change depending on laboratory requirements.

### 3.8 Sample Preservation and Handling

Groundwater samples will be collected in the designated size and type of containers required for specific parameters. Sample containers will be filled in such a manner as not to lose preservatives by spilling or overfilling. Upon obtaining the groundwater samples, they will be packed into insulated, ice-filled coolers. Sample preservation methods will be used to retard biological action, retard hydrolysis, and reduce sorption effects. These methods include chemical addition, refrigeration, and protection from light. Samples will be



kept at no more than 6°C from collection to laboratory delivery. Golder personnel will deliver the samples to a laboratory courier or sent via overnight courier following chain-of-custody procedures.

### 3.9 Chain-of-Custody Program

The chain-of-custody (COC) program will allow for tracing sample possession and handling from the time of field collection through laboratory analysis. The COC program includes sample labels, sample seals, field Groundwater Sample Collection Forms, and the COC record.

Field personnel who collect the samples are responsible to initiate the chain-of-custody protocol. Upon sample collection, but prior to storage, shipment, or transportation, field personnel shall properly and completely fill out the chain-of-custody form with a waterproof ink pen. The Field Team Leader shall review the form prior to sample storage, shipment, or transportation. If an individual makes an error during the completion of the chain-of-custody form, a line shall be drawn through the error and the correction entered. Field personnel completing the form shall initial and date the error. Under no circumstances is white-out or erasing acceptable. Field sampling personnel are responsible for making a copy of the completed chain-of-custody form and giving the form to the Project Manager. The Project Manager or designee shall review the form and place it in the project file with the field sampling forms. Upon receipt by the laboratory, the laboratory sample custodian shall assume responsibility for completing the chain-of-custody procedures. Upon completion of analysis, the laboratory shall submit a copy of the completed chain-of-custody form with the analytical data to the Project Manager who will place it in the project file.

#### 3.9.1 Sample Labels

Sample labels sufficiently durable to remain legible when wet will contain the following information, written with indelible ink:

- Site and sample identification number
- Sample location
- Date and time of collection
- Name of collector
- Parameters to be analyzed
- Preservative, if applicable

The specific sample ID's will follow the form MW-XX, where MW indicates a monitoring well and XX represents the monitoring well ID. Each sample identification number and description will be recorded on the field Groundwater Sample Collection Form and on the COC document.



### **3.9.2 Sample Seal**

The shipping container will be sealed to prevent the samples from being disturbed during transport to the laboratory. A seal will be placed across the front and back of each cooler containing samples when coolers are ready for shipment. All custody seals will be signed and dated.

### **3.9.3 Chain-of-Custody Record**

The COC record is required for tracking sample possession from time of collection to time of receipt at the laboratory. The National Enforcement Investigations Center (NEIC) of USEPA considers a sample to be in custody under any of the following conditions:

- It is in the individual's possession
- It is in the individual's view after being in his possession
- It was in the individual's possession and he/she locked it up
- It is in a designated secure area

All environmental samples will be handled under strict COC procedures beginning in the field. The field team leader will be the field sample custodian and will be responsible for ensuring that COC procedures are followed. A COC record will accompany each individual shipment. The record will contain the following information:

- Sample destination and transporter
- Sample identification numbers
- Signature of collector
- Date and time of collection
- Sample type
- Identification of monitoring well
- Number of sample containers in shipping container
- Parameters requested for analysis
- Signature of person(s) involved in the chain of possession
- Inclusive dates of possession

A copy of the completed COC form will be placed in water resistant bag and accompany the shipment and will be returned to the shipper after the shipping container reaches its destination. The COC record will also be used as the analysis request sheet. When shipping by courier, the courier does not sign the COC record: copies of shipping forms are retained to document custody.



## 4.0 ANALYTICAL AND QUALITY CONTROL PROCEDURES

### 4.1 Data Quality Objectives

As part of the evaluation component of the Quality Assurance (QA) program, analytical results will be evaluated for precision, accuracy, representativeness, completeness, and comparability (PARCC). These are defined as follows:

- Precision is the agreement or reproducibility among individual measurements of the same property, usually made under the same conditions
- Accuracy is the degree of agreement of a measurement with the true or accepted value
- Representativeness is the degree to which a measurement accurately and precisely represents a characteristic of a population, parameter, or variations at a sampling point, a process condition, or an environmental condition
- Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under correct normal conditions
- Comparability is an expression of the confidence with which one data set can be compared with another data set in regard to the same property

The accuracy, precision and representativeness of data will be functions of the sample origin, analytical procedures and the specific sample matrices. Quality Control (QC) practices for the evaluation of these data quality indicators include the use of accepted analytical procedures, adherence to hold time, and analysis of QC samples (e.g., blanks, replicates, spikes, calibration standards, and reference standards).

Quantitative QA objectives for precision and accuracy, along with sensitivity (detection limits) are established in accordance with the specific analytical methodologies, historical data, laboratory method validation studies, and laboratory experience with similar samples. The Representativeness of the analytical data is a function of the procedures used to process the samples.

Completeness is a qualitative characteristic, which is defined as the fraction of valid data obtained from a measurement system (e.g., sampling and analysis) compared to that which was planned. Completeness can be less than 100 percent due to poor sample recovery, sample damage, or disqualification of results, which are outside of control limits due to laboratory error or matrix-specific interferences. Completeness is documented by including sufficient information in the laboratory reports to allow the data user to assess the quality of the results. The overall completeness goal for each task is difficult to determine prior to data acquisition. For this project, all reasonable attempts will be made to attain 90% completeness or better (laboratory).

Comparability is a qualitative characteristic, which allows for comparison of analytical results with those obtained by other laboratories. This may be accomplished through the use of standard accepted methodologies, traceability of standards to the National Bureau of Standards (NBS) or USEPA sources,



use of appropriate levels of quality control, reporting results in consistent, standard units of measure, and participation in inter-laboratory studies designed to evaluate laboratory performance.

Data quality and the standard commercial report package will be evaluated with respect to PARCC criteria using the laboratory's QA practices, use of standard analytical methods, certifications, participation in inter-laboratory studies, temperature control, adherence to hold times, and COC documentation following the data quality assessment procedures (also called Data Validation) described herein. The laboratory QC control limits in place at the time of sample analysis, which are routinely re-evaluated following the procedures in the laboratory quality assurance policies and the requirements of the analytical methods, will be used as the quantitative QC criteria.

## **4.2 Quality Assurance/Quality Control Samples**

This section describes the various Quality Assurance/Quality Control (QA/QC) samples that will be collected in the field and analyzed in the laboratory and the performance frequency. A summary of the groundwater and QA/QC samples is provided in Table 2.

### **4.2.1 Field Equipment Rinsate Blanks**

In cases where sampling equipment is not dedicated or disposable, an equipment rinsate blank will be collected. The equipment rinsate blanks are prepared in the field using laboratory-supplied analyte-free water. The water is poured over and through each type of sampling equipment following decontamination and submitted to the laboratory for analysis of target constituents. Equipment blanks will be collected at a frequency of one equipment blank per sample team per event based on sampling method using disposable equipment (i.e., peristaltic pump tubing).

### **4.2.2 Field Duplicates**

Field duplicates are collected by sampling the same location twice, but the field duplicate is assigned a unique sample identification number. Samplers will document which location is used for the duplicate sample on the sample collection form. One field duplicate will be collected for every 10 samples.

Field duplicate samples will be given a unique sample ID in the form Field Duplicate NN, where NN is a sequential number for the event. The field duplicate sample will be submitted with a generic sampling time of 12:00 so that the sample time cannot be used to deduce the sampling location. The location where the field duplicate sample is collected will be recorded on both the field form and in the log book.

### **4.2.3 Laboratory Quality Control Samples**

Electrolux selected TestAmerica, a national laboratory, to analyze most of the groundwater samples. TestAmerica's Des Moines, Iowa laboratory will analyze all parameters with the exception of dissolved gasses, which will be analyzed by Pace Analytical. TestAmerica and Pace have established QC check



program using procedural (method) blanks, laboratory control spikes, matrix spikes, and duplicates. Details of the internal QC checks used by TestAmerica are provided in the laboratory Quality Assurance Manual (QAM) and the published analytical methods. These QC samples will be used to determine if results may have been affected by field activities or procedures used in sample transportation or if matrix interferences are an issue. One (1) Matrix Spike (MS)/ Matrix Spike Duplicate (MSD) set (i.e. one sample plus one MS, and one MSD sample at one location) will be collected per 20 samples. MS/MSD samples will have a naming convention as follows:

- Sample: MW-24
- MS: MW-24-MS
- MSD: MW-24-MSD

### 4.3 Laboratory Quality Control Procedures

TestAmerica and Pace adhere to quality assurance programs that complies with the National Environmental Laboratory Accreditation Conference (NELAC) program, which is documented in their respective QAMs. This document describes mechanisms employed by TestAmerica and Pace to ensure that reported data meet or exceed applicable EPA and State requirements. The QAM describes the laboratory's experience, its organizational structure, and procedures in place to provide quality analytical data. The QAM outlines the sampling, analysis, and reporting procedures used by the laboratory. TestAmerica and Pace are responsible for the implementation of and adherence to the QA/QC requirements outlined in the QAM. Copies of the TestAmerica and Pace QAMs can be provided upon request.

Audits are an important component of the quality assurance program at the laboratory. Internal system and performance audits are conducted periodically to ensure adherence by all laboratory departments to the QAM. External audits are conducted by accrediting agencies or states. These reports are transmitted to department managers for review and response. TestAmerica and/or Pace will take corrective measures for any finding or deficiency found in an audit per their accreditation requirements.

Data Quality Reviews (DQRs), or equivalent, are requests submitted to the laboratory to formally review results that differ from historical results, or that exceed certain permit requirements or quality control criteria. The laboratory prepares a formal written response to DQRs explaining discrepancies. The DQR is the first line of investigation following any anomalous result.

#### 4.3.1 Laboratory Documentation

Upon receipt of the samples at TestAmerica or Pace, the following activities are recommended:

- The date, time of sample collection, and analysis to be performed will be provided to TestAmerica and Pace.



- The samples will be examined upon receipt to ensure collection in EPA-approved containers for the requested analysis. The sample collection data and time will also be reviewed to ensure the EPA-required sample holding time has not expired or will not expire before the analysis can be performed.
- The information concerning transportation mode and manner will be reported on the form. Samples will be transported on ice or under refrigeration, and the inside temperature of the cooler recorded upon opening.
- The pH of each sample as well as the sample appearance will be recorded if required by the analytical method. Also, preservative adjustments, filtration, and sample splitting will also occur as required prior to distribution. Sample adjustments will be fully documented.

During analysis of the samples, it is recommended that the laboratory agent maintain the integrity of the samples as follows:

- During the sample analysis period, the samples will be preserved in accordance with method guidelines.
- If at any point during the analysis process, the results are considered technically inaccurate, the analysis will be performed again if holding times have not been exceeded.

Documentation activities should be completed with permanent ink in a legible manner with mistakes crossed out with a single line.

#### **4.4 Laboratory Analyses**

Analytical procedures will be performed in accordance with EPA *Test Methods for Evaluating Solid Waste - Physical/Chemical Methods*, SW-846, as updated and other EPA-approved methods. The proposed test methods are listed in Table 2. The selected analytical methods provide Limits of Quantitation (LOQs) that are below applicable groundwater standards.

Alternate methods may be used if they have the same or lower LOQ. Methods with higher LOQs will be considered if the concentration of the parameter is such that an alternate test method with a higher LOQ will provide the same result.

##### **4.4.1 Limits of Quantitation (LOQs)**

Laboratory-specific LOQs will be used as the reporting limits for quantified detections of required monitored constituents. Laboratory LOQs should be reported with the sample results.

##### **4.4.2 Method Blanks**

Laboratory method blanks are used during the analytical process to detect any laboratory-introduced contamination that may occur during analysis. A minimum of one method blank should be analyzed by the laboratory per sample batch.



#### 4.5 Data Review, Verification, and Validation

Data review, verification, and validation techniques include screening, accepting, rejecting or qualifying data on the basis of specific QC criteria to identify quality issues, which could affect the use of the data for decision making purposes. Following receipt of the analytical data from the subcontract laboratory, Golder will validate 100% of the groundwater data. Using the terminology from Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 540 R-10-006, January 2009), 100% of the data will undergo Stage 2B data validation, which assesses both sample-related and instrument-related QC parameters. In particular, the data will be reviewed for completeness and adherence to the requested analytical methods. Quantitative sample and instrument specific QC parameters, including field and method blank data, matrix spike/matrix spike duplicate (MS/MSD) recovery and precision; laboratory control samples (LCS) and instrument calibrations presented in the summaries provided in the laboratory data packages will be reviewed for conformance with the laboratory QC criteria.

Should QC non-conformances be identified during the data validation, the following qualifiers will be appended to the data<sup>1</sup>:

- U** The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
- J** The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample. No direction of bias is indicated
- J+** The result is an estimated quantity, but the result may be biased high.
- J-** The result is an estimated quantity, but the result may be biased low.
- UU** The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
- R** The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

Qualified results will be reported for validated samples on the analytical reporting forms provided in the data packages or as data summary tables accompanying the laboratory deliverable package. Qualified results, data packages, and analytical results will be stored in the operating record.

The PARCC criteria and criteria specified in applicable guidelines may not always be achievable. The data validation guidelines provide directions for the determination of data usability. Qualified data can often provide useful information, although the degree of certainty associated with the result may not be as planned. Professional judgment, in conjunction with USEPA guidance documents, will be used to determine data usability and where necessary, professional judgment will be used to evaluate scenarios not specifically described in the referenced documents. Should the Stage 2B validation identify deficiencies

<sup>1</sup> Note that the U and J qualifiers may also be associated with the data by the laboratory to indicate non-detect and estimated values below the LOQ respectively.



that were not addressed, after consultation with Electrolux, Golder would move to a more extensive validation for that data package.

#### **4.6 Reconciliation with User Requirements**

Throughout the project, Electrolux and Golder will determine if project data quality objectives (DQO) are being met and assess whether the data being collected is sufficient and appropriate. Periodic evaluations of the monitoring program will be made to determine if a change in frequency or analytical parameters is appropriate. Individuals making measurements throughout the process will also make assessments of whether the DQO are being met.

Individuals making field measurements will determine whether field quality control criteria were met. The field QA/QC will be overseen by the field team leader. Corrective actions will be initiated in the field as necessary. This corrective action may include recalibration of instruments or use of a different type of instrument.

The analysts in the laboratory will determine if analytical QC criteria are achieved. Corrective action in the form of re-analysis or re-calibration may be warranted. Laboratory analytical data and field data will be assessed by a data validation specialist under the direction of the QA Manager to determine usability with regard to the DQO.

As noted in the data validation guidelines, data may not always meet precision and accuracy requirements but may still be considered usable. The data will be assessed with regard to the project DQO, and professional judgment used in conjunction with guidance documents will determine data usability.



## 5.0 DATA MANAGEMENT PROCEDURES

This section presents the Data Management Procedures that will be implemented during the performance of the field work.

### 5.1 Analytical Data Record

Golder will use EQUiS® (Environmental Quality Information System) to electronically manage groundwater quality and water level elevation data. EQUiS® is a web-enabled environmental data management system written in the Microsoft NET Framework, and is hosted at Golder in a Microsoft SQL Server environment. Only authorized Golder personnel have access to the database.

EQUiS® uses a variety of tools and customizable business rules to enforce data quality and provides links to many third-party tools commonly used for data visualizations and data analysis (e.g. EVS/MVS®). Golder will acquire, check, and load the laboratory analytical data into EQUiS® for secure tracking and reporting of data.

The laboratory analytical data will be acquired, checked, and loaded into EQUiS® using the following methods:

- Field samples will be collected following the procedures outlined in the SOPs
- Samples will be delivered to the laboratory for analytical testing. Copies of the chain of custody (COC) and field sample forms will be sent by overnight courier or scanned to electronic copy and e-mailed to the Golder Project Manager
- Following sample analysis, the laboratory will produce and e-mail Electronic Data Deliverables (EDDs) to the Golder Project Manager. Golder will upload the EDDs into the EQUiS® Data Processor (EDP) along with additional information from the field forms. The data added to the EDDs will include, but are not limited to:
  - Sample location codes
  - Sample matrix codes
  - Sample type codes
  - Parent sample codes for replicate samples
  - Sample delivery group codes

Golder personnel will check the information (e.g., time stamps for proper format and test information) and revise as necessary. The EQUiS® EDP will check the EDDs for common laboratory errors, such as chronological event errors, duplicate rows, orphan samples, and inconsistencies with the EQUiS® system's valid value tables. Once the data are checked and reviewed, Golder will upload the EDD packages into the database. The data will then be available to be queried and reported by EQUiS® Enterprise or EQUiS® Professional.



## 5.2 Project Filing Procedures

Field and analytical data, and associated reports generated by Golder and its subcontractors in performance of the work will be maintained in the Golder Manchester, New Hampshire office. Golder will maintain the records in accordance with our standard document control protocols



## 6.0 REPORTING

Golder will provide Electrolux with an annual Technical Memorandum following the Fall monitoring event. The Technical Memorandum will include a description of the field activities, tables, figures, a discussion of the analytical results, and recommendations for modifications to the GMP.

**Table 1: Environmental Monitoring Program**  
**Former Electrolux Home Products Inc. Facility**  
**Jefferson, Iowa**

| Well ID                            | Screened Interval<br>(feet bgs) | Sampling Rationale   |
|------------------------------------|---------------------------------|--|
| <b>Upper Till Units</b>            |                                 |  |
| MW-24                              | 13-18                           | Monitor northern end of plume                              |
| MW-26S                             | 11-16                           | Monitor center of plume                                    |
| MW-28                              | 13-18                           | Monitor center of plume                                    |
| MW-29                              | 16-21                           | Monitor center of plume                                    |
| MW-31                              | 13-18                           | Monitor SE plume boundary                                  |
| MW-43I                             | 24.5-29.5                       | Monitor south of plume boundary                            |
| MW-44                              | 17-22                           | Monitor south of plume boundary                            |
| MW-56S                             | 3-13                            | Monitor SE plume boundary                                  |
| <b>Yellow-Brown Till Unit</b>      |                                 |  |
| MW-43D                             | 36-41                           | Monitor southwestern side of plume                         |
| MW-46                              | 36-41                           | Monitor center of plume                                    |
| MW-47D                             | 37-42                           | Monitor center of plume                                    |
| MW-56D                             | 33-38                           | Monitor southeast side of plume boundary                   |
| MW-57                              | 32-37                           | Monitor plume centerline                                   |
| MW-66                              | 45-55                           | Monitor downgradient edge of plume                         |
| <b>Dark Gray Till</b>              |                                 |  |
| MW-65                              | 68-73                           | Monitor beneath center of plume                            |
| <b>Pleistocene Sand and Gravel</b> |                                 |  |
| MW-67                              | 87-97                           | Monitor groundwater quality in Pleistocene Sand and Gravel |

Checked By: JSP  
Reviewed By: APTM

**Table 2: Groundwater Sampling Analytical Methods and QA/QC**  
**Former Electrolux Home Products Inc. Facility**  
**Jefferson, Iowa**

| Well ID and Unit   | Parameter                                 | Method <sup>(a)</sup>  | Field Samples/<br>Spring | Field Samples/<br>Fall | Field Duplicates <sup>(b)</sup> | MS/MSD <sup>(c)</sup> | Trip Blanks | Equipment Blanks | Number of Samples | Field Parameters <sup>(g)</sup> |
|--|---|------------------------|--------------------------|------------------------|---------------------------------|-----------------------|-------------|------------------|-------------------|---------------------------------|
| <b>Upper Till Units:</b><br><br>MW-24, MW-26S, MW-28, MW-29, MW-31, MW-43I, MW-44, MW-56S<br><br><b>Yellow-Brown Till Unit:</b><br>MW-43D, MW-46, MW-47D, MW-56D, MW-57, MW-66<br><br><b>Dark Gray Till:</b><br>MW-65<br><br><b>Pleistocene Sand and Gravel Unit:</b><br>MW-67 | VOCs                                      | SW-846 8260B/SIM 8260B | 16                       | 16                     | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               | Water Quality                   |
|  | Alkalinity (CaCO <sub>3</sub> )           | SW-846 2320B           | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |
|  | Dissolved Gases (Methane, Ethane, Ethene) | SW-846 3810            | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |
|  | Sulfate                                   | SW-846 9056            | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |
|  | Sulfide                                   | SW-846 9034            | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |
|  | Chloride                                  | SW-846 9056            | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |
|  | Iron                                      | SW-846 6010C           | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |
|  | Manganese                                 | SW-846 6010C           | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |
|  | Total Organic Carbon                      | SW-846 9060A           | 16                       |                        | 1 per 10 samples                | 1 per 20 samples      | (d)         | (e)              | (f)               |                                 |

## Notes:

(a) EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, Final Update III, December 1996). Updated 2013

(b) Field duplicates will be collected at a frequency of 1 per 10 samples, per analysis, per sampling round.

(c) Matrix spike and matrix spike duplicate samples will be collected at a frequency of 1 per 20 samples, per analysis, per sampling round.

(d) One trip blank will be submitted with each cooler containing samples for VOC analysis. The actual number of samples will depend on the duration of the field program.

(e) Equipment blanks will be collected at a frequency of 1 equipment blank per sample team per event based on sampling method using disposable equipment (i.e., peristaltic pump).

(f) Number of total samples associated with each site to be determined in the field based on sampling order and number of coolers used.

(g) Monitoring well water-quality parameters include temperature, pH, dissolved oxygen, specific conductance, and oxidation-reduction potential.

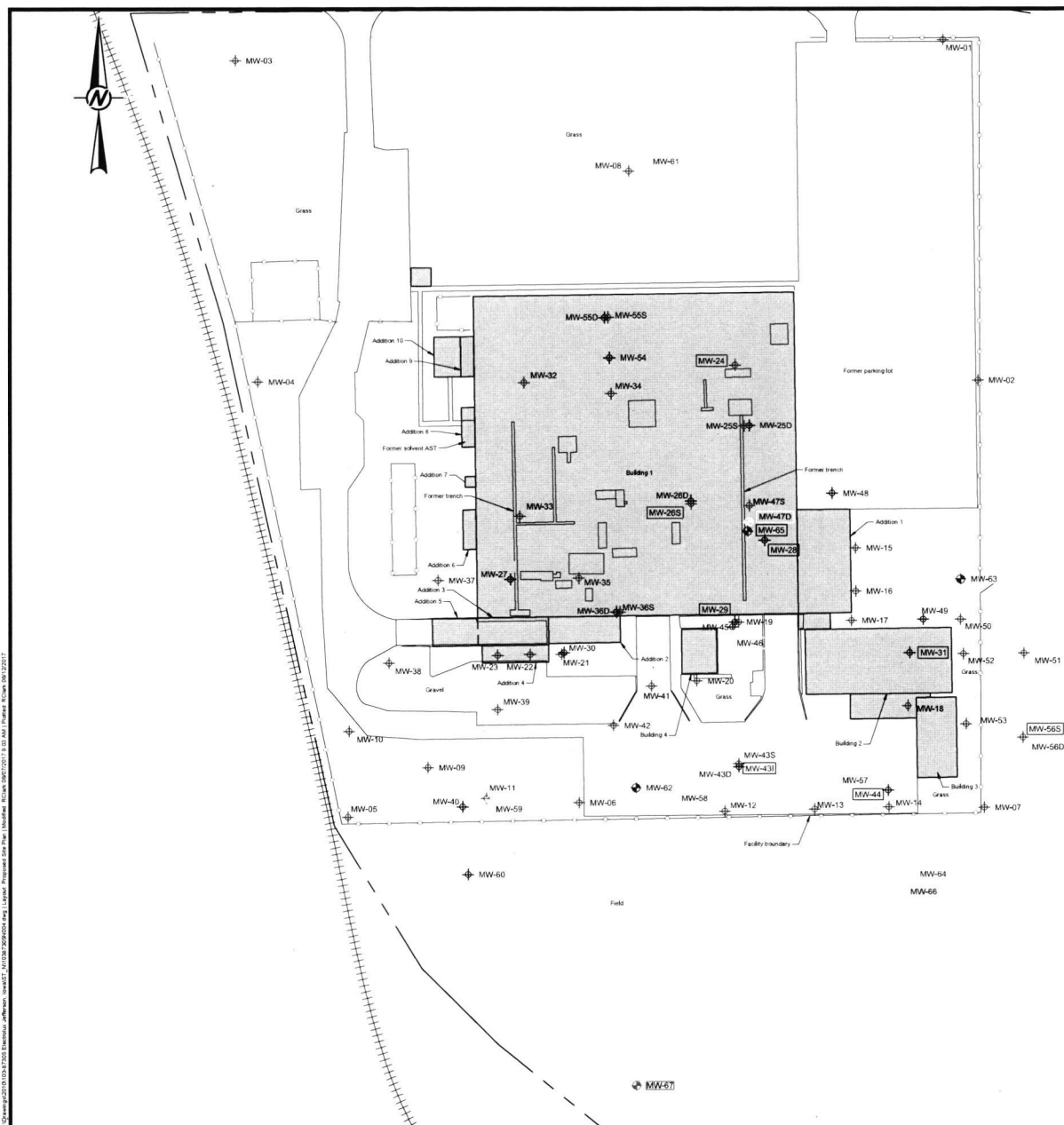
Checked by: JSP  
 Reviewed by: APTM

**Table 3: Sample Containers, Preservatives, Volumes, Holding Times, and Shipping Requirements**  
**Former Electrolux Jefferson Facility**  
**Jefferson, Iowa**

| Matrix      | Parameter                                 | Method                 | Container             | Preservation  | Holding Time         | Shipping          | Packaging        |
|-------------|---|------------------------|-----------------------|---|----------------------|-------------------|------------------|
| Groundwater | VOCs                                      | SW-846 8260B/SIM 8260B | (3) 40 mL purge vials | Cool to 4° C, HCl, pH<2, no headspace               | 7-day holding time   | Overnight carrier | Bubble wrap, Ice |
|             | Alkalinity (CaCO <sub>3</sub> )           | SW-846 2320B           | (1) 1 L plastic       | Cool to 4° C  | 14-day holding time  | Overnight carrier | Bubble wrap, Ice |
|             | Dissolved Gases (Methane, Ethane, Ethene) | SW-846 3810            | (3) 40 mL purge vials | Cool to 4° C, HCl pH<2, no headspace                | 14-day holding time  | Overnight carrier | Bubble wrap, Ice |
|             | Sulfate, Chloride                         | SW-846 9056            | (1) 1 L plastic       | Cool to 4° C  | 28-day holding time  | Overnight carrier | Bubble wrap, Ice |
|             | Sulfide                                   | SW-846 9034            | (1) 500 mL plastic    | Cool to 4° C, NaOH pH>9, ZnAC                       | 7-day holding time   | Overnight carrier | Bubble wrap, Ice |
|             | Iron, Manganese                           | SW-846 6010C           | (1) 250 mL plastic    | HNO <sub>3</sub> , pH<2                             | 6-month holding time | Overnight carrier | Bubble wrap, Ice |
|             | Total Organic Carbon                      | SW-846 9060A           | (1) 250 mL plastic    | Cool to 4° C, H <sub>2</sub> SO <sub>4</sub> , pH<2 | 28-day holding time  | Overnight carrier | Bubble wrap, Ice |

Checked by: JSP  
Reviewed by: APTM





#### LEGEND

|  |  |
|--|--|
|  | Approximate Site Property Boundary                               |
|  | Fence  |
|  | Edge of gravel   |
|  | MW-51<br>Monitoring well screened in Oxidized Brown Till         |
|  | MW-60<br>Monitoring well screened in Unoxidized Grey Till        |
|  | MW-59<br>Monitoring well screened in Yellow/Brown Till           |
|  | MW-62<br>Monitoring well screened in Dark Grey Till              |
|  | MW-67<br>Monitoring well screened in Pleistocene Sand and Gravel |
|  | Monitoring well included in the groundwater monitoring program   |
|  | Former Buildings (slab remains)                                  |

#### NOTES

- 1.) BM #1 elev. = 1052.49 (NAVD 88) center top non-operating bolt on fire hydrant Northwest of main building.
- 2.) JEO consulting group did not find useful NG5 monuments in the Jefferson area. A USGS 24,000x Topographic map elevation (1054.00) at the intersection of Mulberry Street and East Central Street as the assumed NAVD 85 elevation. This elevation agreed with the elevation generated from Geoid-09.
- 3.) The coordinates for this site are approximate Iowa State Plane North 1401 with a ground scale factor of 1.0000463418.

#### REFERENCES

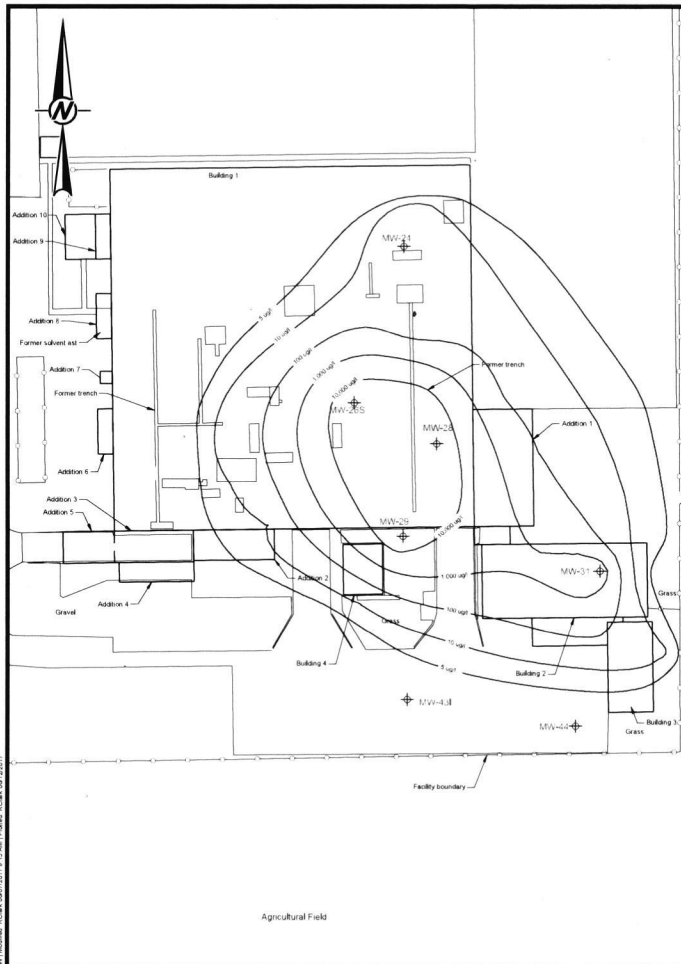
Basemap taken from JEO Consulting Group, Inc. drawing titled, "Electrolux Home Products base map", dated 11/21/10, revised May 2012.

#### FIGURE NARRATIVE

This figure shows the former buildings and well locations at the former Electrolux Home Products facility in Jefferson, Iowa. The features shown on the concrete slab are locations of former concrete-lined floor pits and drains. Outlined monitoring well locations are part of the monitoring program.



|   |             |             |            |
|---|-------------|-------------|------------|
| PROJECT   |             |             |            |
| ELECTROLUX HOME PRODUCTS<br>JEFFERSON, IOWA         |             |             |            |
| TITLE   |             |             |            |
| SITE PLAN ILLUSTRATING<br>MONITORING WELL LOCATIONS |             |             |            |
|   | PROJECT No. | 103-8730501 | FILE No.   |
|   | DESIGN      | JSP         | 2017-62-28 |
|   | CADD        | RWC         | 2017-62-28 |
|   | CHECK       | JSP         | 2017-62-28 |
|   | REVIEW      | APTM        | 2017-62-28 |
| SCALE   |             |             | AS SHOWN   |
| FIGURE  |             |             | 2          |

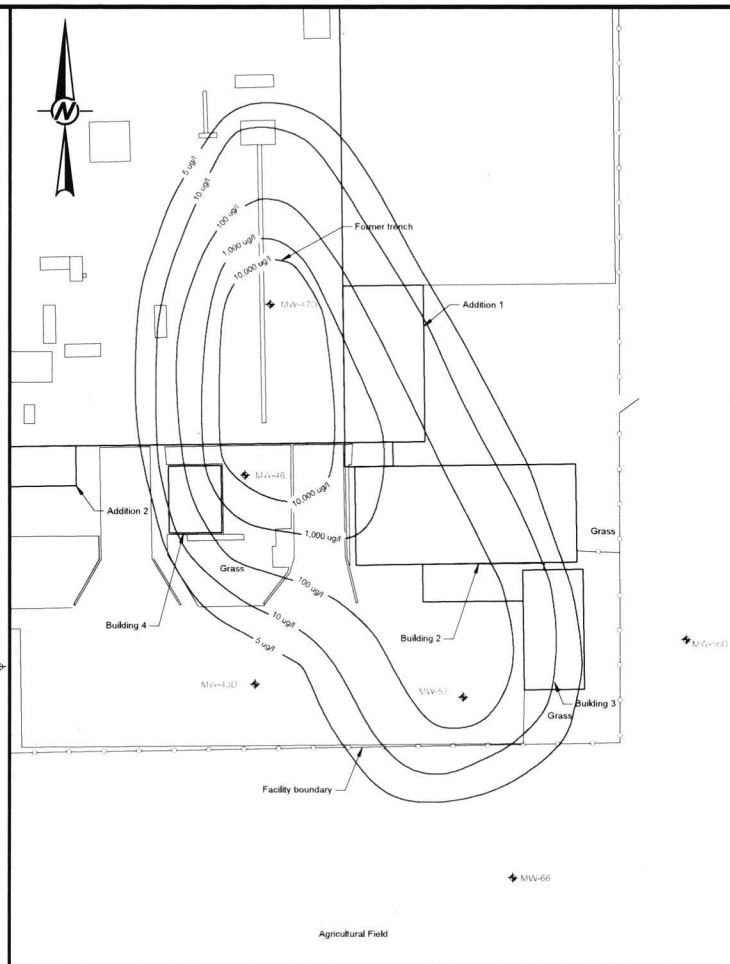


#### LEGEND

|  |  |
|--|--|
|  | Fence  |
|  | Edge of gravel                                   |
|  | Proposed upper till monitoring well location     |
|  | Interpreted TCE iso-concentration contour (ug/L) |
|  | Building   |

#### FIGURE NARRATIVE

This figure shows the interpreted trichloroethene isoconcentration contours based on groundwater analytical data from the December 2012 and October 2013 sampling events for wells screened in the outcaved and uncaved till. The isoconcentration contours are intended to depict the inferred distribution of TCE in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. The TCE distribution in groundwater is known to vary with time.



#### LEGEND

|  |   |
|--|---|
|  | Fence   |
|  | Edge of gravel                                      |
|  | Proposed yellow-brown till monitoring well location |
|  | Interpreted TCE concentration contour (ug/L)        |
|  | Former Buildings (slab remains)                     |


#### FIGURE NARRATIVE

This figure shows the interpreted trichloroethene isoconcentration contours based on groundwater analytical data from the March 2013 to October 2016 sampling events for wells screened in the yellow-brown till. The isoconcentration contours are intended to depict the inferred distribution of TCE in groundwater on the basis of the data illustrated. The distribution is likely more heterogeneous than shown, and the actual conditions will vary. Other interpretations are possible. The TCE distribution in groundwater is known to vary with time.



#### NOTES

- 1.) BM #1 elev. = 1052.49 (NAVD 88) center top non-operating bolt on fire hydrant Northwest of main building.
- 2.) JEO consulting group did not find useful NGS monuments in the Jefferson area. A USGS 24,000 Topographic map elevation (1054.00) at the intersection of Mulberry Street and East Central Street as the assumed NAVD 88 elevation. This elevation agreed with the elevation generated from Geoid-09.
- 3.) The coordinates for this site are approximate Iowa State Plane North 1401 with a ground scale factor of 1.0006463418.
- 4.) ug/L = Micrograms per liter

|   |             |   |                |
|---|-------------|---|----------------|
| PROJECT   |             | ELECTROLUX HOME PRODUCTS<br>JEFFERSON, IOWA |                |
| TITLE   |             |   |                |
| SITE PLAN ILLUSTRATING UPPER TILLS<br>AND YELLOW-BROWN TILL                           |             |   |                |
|  | PROJECT No. |   | 103-47305      |
|   | DESIGN      |   | JSP 2017-02-24 |
|   | CADD        |   | RWC 2017-02-24 |
|   | CHECK       |   | JSP 2017-02-24 |
|   | REVIEW      |   | APT 2017-02-24 |
| FILE No.  |             | 10387305N001                                |                |
| SCALE   |             | AS SHOWN                                    |                |
| FIGURE  |             | 3   |                |



At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

|               |                   |
|---------------|-------------------|
| Africa        | + 27 11 254 4800  |
| Asia          | + 852 2562 3658   |
| Australasia   | + 61 3 8862 3500  |
| Europe        | + 356 21 42 30 20 |
| North America | + 1 800 275 3281  |
| South America | + 55 21 3095 9500 |

[solutions@golder.com](mailto:solutions@golder.com)  
[www.golder.com](http://www.golder.com)

**Golder Associates Inc.**  
**670 N. Commercial Street, Suite 103**  
**Manchester, NH 03101 USA**  
**Tel: (603) 668-0880**  
**Fax: (603) 668-1199**



**Golder  
Associates**

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation